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THIS IS UNEVALUATED INFORMATION

[redacted]

Difficulties encountered in the Development of Turbojet Engines.

1. By September 1950, the specific fuel consumption of the Jumo-004 turbojet engine was reduced to 320 grams/hp/h. This improvement was achieved by altering the profiles of the first and second compressor stage and by improving the turbine rating by changing the profiles of the individual rotor stages of the turbine. This resulted in a degree of efficiency of 0.82 to 0.84 of the compressor and of 0.87 to 0.89 of the turbine assembly. Engineers Irzik (fnu) and Korb (fnu) stated that, by late 1951, the fuel consumption was reduced to 300 g/hp/h and that efforts were made for a further reduction to 280 g/hp/h. Both engineers believed that this would be successfully achieved by increasing the pressure in the compressor, lowering the pressure in the turbine, and improving the combustion process in the burner cans.

2. The Jumo-012 passed a 400-hour test and the Jumo-022 a test of 200 hours. While the compressor of the Jumo-022 successfully passed a test run of 400 hours, damage at the burner cans appeared and, in the second half of the 400-hour test, there was also damage to the turbine, caused by vibrations of the turbine blades, and cracks in the turbine discs were caused because of poor material and by vibrations. Better results were achieved after 25X1 better, high-grade heat-resistant material was used and after the center of gravity of the turbine blades had been moved by changing the profiles of the blades. [redacted] difficulties were finally overcome.

25X1 3. [redacted] that the German engineers were not supplied the best materials for the construction of the aforementioned engine parts. The Soviets probably wanted the German technicians to conduct their experiments under conditions of extreme strain for the engine parts. It was known that better materials were available. Single parts, i.e., impeller wheels, turbine discs and blades, of a Soviet constructed Nene power plant which were balanced at Experimental Plant No 2 were made of first class materials. It was also assumed that Experimental Plant No 2 was not included in the program of the current Five-Year Plan, and that no Germans should win awards. The importance of experimental plants in the Soviet

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Union is always secondary when compared with the plants engaged in mass production. Serious difficulties were encountered 25X1 in the supply of duraluminum for the manufacture of turbine blades.

4. There were difficulties to overcome regarding the high thermal strain of the Jumo-012 power unit. The blades showed slight displacements and a brittleness which was eliminated by precision forging. The material used for the blades could only stand a maximum temperature of 1,150° k (Kelvin scale), and there was a temperature of 1,120° k at the turbine. [redacted] mass 25X1 produced turbines of the Jumo-012 turbojet with blades manufactured of the same poor materials would stand 400 hours of operation. Excellent results were obtained from one Jumo-012 turbine assembly which, for comparison, was made of nimonic steel.

25X1 5. [redacted] did not believe [redacted] the **Soviets** intentionally supplied 25X1 poor materials to the Experimental Plant in Upravlencheskiy; [redacted] 25X1 [redacted] they tried to use only domestic materials.

6. The Jumo-022 turboprop engine had a temperature of 1,060° k at the turbine. After some preliminary difficulties had been overcome, the turbine of the Jumo-022 proved to be excellent and able to stand a 600-hour test run. Difficulties with the Jumo-022 were restricted to some minor trouble with the auxiliaries and their drives.

7. Efforts were made to reduce the fuel consumption of the Jumo-022 turboprop by packing the space between the stator and rotor blades of the compressor with graphite paste. However, after 50 hours of operation, the paste was pressed out again. Source believed that the reduction of the fuel consumption was mainly achieved by a double twist (doppelt gewundene Turbinenschaufeln) of the turbine blades. [redacted] 25X1

8. There were English, American, and French technical publications available at the plant including S&K, Flight, Aircraft Engineering, Science et Vie, Aviation Week, and other magazines. The supply of books was insufficient, probably because the library was still being established. Many German engineers ordered books from Germany. So-called "Express Information" was supplied by the **TsIAM** and **TsAGI** Institutes. Most of this information involved poor translations of Western publications.

9. The **Soviets** requested that the Jumo-012 should be designed anew although the blueprints were available in Moscow. A long time after the charts for the axial compressor of the Jumo-022 turboprop engine had been recalculated, a **Soviet** from the **TsIAM** Institute showed an original chart of the same unit to the German engineers. The documents had been obtained from the Brueckner & Kanis Firm in Dresden, which temporarily housed evacuated sections of the Junkers Plant. The Germans never understood why the **Soviets** withheld technical information of this type. Possibly they intended to determine the actual capability of the German scientists, or perhaps they did not trust them.

25X1 [redacted]

10. The high altitude test stand which, in 1946, had been dismantled at the Otto Nador Plant had not been unpacked at Experimental Plant No 2 at the end of 1951. It was said that no bricks were available for the installation of the stand. [redacted] 25X1

25X1 [redacted] data of this stand, which had been constructed in 1939 to 1940: air throughput 1.2 to 1.5 kg/sec, intake temperature - 35° C. The intake pressure was equivalent to conditions at an altitude of 10,000 meters.

11. Prior to the fall of 1949, the quantity of power supplied was insufficient to fill the high requirements of Plant No 2 and the population of about 2,200 people. The power was supplied through one single transformer. Conditions were improved and, by 1950, sufficient power was supplied by a new thermal power plant in Dezymyanka. In late 1950, this power plant had to be enlarged again.